

Managing the life cycle of virtual teams

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Executive Overview

In the fast-paced, technology-driven 21st century, virtual project teams represent a growing response to the need for high-quality, low-cost, rapid solutions to complex organizational problems. Virtual project teams enable organizations to pool the talents and expertise of employees (and non-employees) by eliminating time and space barriers. Yet, there is growing evidence that virtual teams fail more often than they succeed. To understand the factors that contribute to virtual team effectiveness, we tracked six virtual project teams from a large food distribution company from inception to project delivery. We identified factors at each stage of the virtual-team life cycle that affected team performance. These results provide specific examples of what managers can do, at various points in time, to increase a virtual team's chances to fully develop and contribute to firm performance.

FOODCO* has grown dramatically over the last several years as the result of numerous acquisitions. One of the nation's largest food distributors, FOODCO has more than 20 operating companies located throughout the United States. To maximize long-term performance, FOODCO executives wanted to tap into the knowledge and expertise of employees located throughout the newly expanded company. In particular, executives wanted to encourage the sharing of best practices across operating companies, streamline work processes, prepare managers for promotion, and develop a unified culture. To address these issues intelligently, quickly, and effectively, FOODCO created virtual project teams.

Virtual project teams represent a recent response to the demand for high-quality, rapid solutions to complex issues such as those faced by FOODCO. Virtual project teams include individuals who are geographically dispersed and interact primarily through telecommunications and information technologies to accomplish specific objectives within specified timeframes.¹ Assignments for these teams might include designing new products, developing strategies, and revising operating procedures. Virtual project teams allow organiza-

tions to pool the talents and expertise of employees regardless of employee location, overcoming time and distance barriers to accomplish critical tasks quickly and effectively.

But simply establishing virtual project teams does not guarantee success. In fact, virtual teams are often less effective than face-to-face teams on many outcome measures.² Virtual project teams can experience difficulties at every stage of their development. Improved understanding of how virtual project teams develop and mature will provide managers with important insights that might increase a team's contributions to firm performance.

The authors were able to follow six virtual project teams at FOODCO from inception through project delivery to assess how teams developed and to determine what factors contributed to performance at each stage of the project-team life cycle. We surveyed and interviewed team members throughout an eight-month project period and gathered information on how top executives at FOODCO and outside experts evaluated each team's deliverables. Our data provide useful insights about virtual project team development, the challenges encountered at various points in team life cycles, and suggestions for overcoming these challenges. We discuss the implications of our findings for organizations planning to adopt or currently using virtual project teams. We also offer

* FOODCO is a pseudonym being used to protect the anonymity of the company.

specific recommendations for coaching virtual teams at each stage of their life cycle.

The Emergence of Virtual Teams

Globalization and technological advancements have led to an increase in virtual team use over the last decade. Estimates suggest that in the US alone, as many as 8.4 million employees are members of one or more virtual teams or groups.³ Numerous studies of virtual teams document how they operate and how they compare to traditional, face-to-face teams. For example, *The Executive* has published several articles discussing the birth of virtual teams as an alternative work form, the advantages and disadvantages of virtual work, and the specific challenges confronting virtual teams.⁴

Virtual teams afford many advantages to organizations, including increased knowledge sharing and employee job satisfaction and commitment, as well as improved organizational performance.⁵ However, virtual teams can also face a number of unique challenges that often prevent them from obtaining successful outcomes. Broadly, these challenges include (1) logistical problems, such as communicating and coordinating work across time and space, (2) interpersonal concerns, such as establishing effective working relationships with team members in the absence of frequent face-to-face communication, and (3) technology issues, such as identifying, learning, and using technologies most appropriate for certain tasks.⁶

There is an abundance of advice to managers on how to motivate virtual teams to high levels of performance. Some authors encourage managers to help virtual teams draft mission statements, set goals, and coordinate their work. Others emphasize the importance of teambuilding exercises to create a team identity and strengthen interpersonal relationships. Much of this advice is based on single observations or laboratory studies with student virtual teams. Our goal is to understand how virtual teams of real employees develop through every phase of a team life cycle from team formation through product delivery. Our focus is on helping managers understand the special challenges that virtual project teams confront at each stage of development and how to time intervention strategies so that teams can make smooth transitions.

The Life Cycle of Virtual Project Teams

Teams are more effective when members can combine their individual talents, skills, and experiences via appropriate working relationships and processes.⁷ Two models that describe how teams

evolve through this process have been proposed by Tuckman (1965) and Gersick (1988).⁸

Tuckman's Stage Model of Development

Based on an extensive analysis of groups located in one place, Tuckman identified four distinct stages of team development: forming, storming, norming, and performing. During the forming stage, team members share information about themselves and their task explicitly through discussions or implicitly through non-verbal cues, such as status symbols or physical traits. Ideally, team members also establish trust, clarify group goals, and develop shared expectations in this stage. Efforts to resolve these issues often surface differences of opinions, and in the storming stage, conflicts emerge as team members work to identify appropriate roles and responsibilities. Groups able to resolve conflicts move to the norming stage. In this stage, teams recognize and agree on ways of working together, strengthen relationships, and solidify understanding of member obligations, all of which increase levels of trust, mission clarity, and coordination. Finally, teams reach the performing stage during which team members work toward project completion, actively helping and encouraging each other.

Gersick's Punctuated Equilibrium Model

Gersick examined the impact of deadline pressures on the development processes of work teams. She described a "punctuated equilibrium" model of development in which a team's evolution is marked by two periods of stability—Phase I and Phase II—punctuated by abrupt changes at the project midpoint that occurs halfway to the deadline.⁹ Phase I begins with the first team meeting and continues until the team is halfway to a project's deadline. During Phase I, teams try to establish a working agenda and to develop norms that guide early project efforts. These activities parallel Tuckman's forming, storming, and norming stages. At the project midpoint, a transition occurs as teams assess the norms and assumptions set during Phase I. Teams dissatisfied with their progress may seek advice from an outside leader or facilitator in order to develop more effective norms. Teams satisfied with their performance maintain the status quo. With a successful transition, team members focus on their performance for the duration of the project (Phase II). This transition is usually followed by a burst of activity to insure that the team meets the deadline with an acceptable outcome.

Some evidence shows that virtual teams evolve through processes similar to those described by

Tuckman and Gersick, although differences in the speed and pattern of development appear to exist.¹⁰ These findings provide some clues that the evolution of virtual project teams may be more complex and challenging than for co-located teams. For instance, reliance on electronic communication may slow the establishment of trust, limit conflict resolution, promote free riding, and inhibit team synergy and performance. Similarly, it may be more difficult for virtual project teams to (re)assess their progress, reflect on collective work ethics, and recommit to task completion within designated time frames, as described by the punctuated equilibrium model. These issues, which we detail in the next section, are summarized in Table 1.

The Challenges Associated with Virtual Team Development

Forming

In co-located teams, face-to-face interactions during the early stages of a project provide opportunities for building relationships based on common interests and permit individuals to analyze their colleagues' trustworthiness based on observation and conversation. Developing high-quality relationships is more difficult and takes longer when team members are geographically dispersed because reliance on electronic communications often

diminishes communication frequency.¹¹ Proximity enables team members to engage in informal work and non-work related conversations that can occur over coffee, at the water cooler, or during lunch.¹² More frequent interaction increases opportunities to break the ice, establish lines of communication, and identify points of similarity, all of which are critical for successful team formation.

Reliance on electronic communications also increases the potential for faulty first impressions and erroneous stereotypes.¹³ In the absence of visual or audio cues provided by some technologies, team members may develop incorrect stereotypes based on geographic and cultural differences, or differences in functional expertise. These mistaken stereotypes or presumed differences between team members can undermine relationship-building efforts.¹⁴ In particular, teams may struggle to form a collective identity that promotes a shared commitment to a common goal.¹⁵

Successful navigation through the forming stage requires that team members establish a sense of trust.¹⁶ In face-to-face teams, trust develops based on social and emotional attachments. In virtual teams, trust develops based on more identifiable actions as timely information sharing, appropriate responses to electronic communications, and keeping commitments to virtual teammates.¹⁷ These actions signal that team members are competent and

Table 1
Stages of Virtual Project Team Development

Tuckman: Gersick:	Model			
	Forming Phase I	Storming	Norming Midpoint Transition	Performing Phase II
Description of Team Behavior During Each Stage	Team members get to know each other, exchange information about themselves and the task at hand, establish trust among group members, and clarify group goals and expectations	Similarities and differences are revealed and conflicts surface as the group attempts to identify appropriate roles and responsibilities among the members	Team members recognize and agree on ways of sharing information and working together; relationships are strengthened, and team members agree on member obligations and team strategy	Team members work toward project completion, actively helping and encouraging each other
Challenges to Virtual Teams	Fewer opportunities for informal work- and non-work-related conversations; risk of making erroneous stereotypes in the absence of complete information; trust slower and more difficult to develop	Reliance on less rich communication channels may exacerbate conflicts by provoking misunderstandings; ease of withdrawing behaviors; diversity of work contexts; reliance on an emergent or assigned team leader	Difficulty in developing norms around modes of communication, speed, and frequency of responding, and commitment to use special software	Vulnerability to competing pressures from local assignments, frustrations over free-riding or non-committed teammates, and communication discontinuities due to asynchronous communication

want to help the team, but they take time to occur in the virtual environment.

Storming

As table 1 notes, past research on co-located teams suggests that disagreement and conflict characterize the storming stage of team development. In the virtual environment, the use of communication technologies may prolong these conflicts. Without the benefit of the subtle social cues associated with face-to-face communications (body language, tone of voice, and facial expressions), misunderstandings can occur more readily.¹⁸ Electronic communication can exacerbate conflict when team members simply refuse to respond to electronic messages. This explains why virtual teams, particularly those working on complex, non-technical issues, take longer to reach consensus on team process issues than do co-located teams.¹⁹

The presumed diversity of work settings can also inhibit conflict resolution for virtual teams. For example, in some work settings, technology and support staff are available to support virtual teams. In less advanced settings, even minor technical problems can be disruptive for teams and team members. Similarly, in some settings, managers or team members may view virtual team participation as a high priority, while others may view it as a distraction from more immediate concerns. Team members in different work settings can form different expectations regarding how to coordinate work and accomplish team objectives.²⁰

In the storming stage, virtual project team sponsors can appoint team leaders to help minimize conflicts that can occur over role assignments. When leadership selection is based on the skills critical for virtual team success, including conflict management, virtual teams are more likely to survive the storming stage.²¹ However, self-managed virtual project teams are created without a formal leader, and other teams are formed with a misplaced emphasis on a leader's technical as opposed to interpersonal skills. In such cases, the emergence of an informal or social leader may be an agonizingly slow process. And, if virtual teams are low in trust, the absence of an emergent or formal leader can have serious consequences for later team performance.²²

Norming

Table 1 shows that in the norming stage of development, virtual teams work to strengthen relationships, solidify norms around team processes, and reach consensus regarding obligations, timeta-

bles, and deadlines. These efforts mirror the activities that teams may engage in at Gersick's "midpoint transition." At this point, teams assess whether their work processes have been effective or if they need to be revised. Special challenges confronting virtual teams in the norming stage include coordinating work, developing a shared understanding around modes of communication, and the speed and frequency of responding.

Virtual teams must establish norms governing both work processes and communication content. Agreements on timetables and individual areas of responsibility are essential for virtual team effectiveness.²³ Structured schedules and timelines enable virtual team members to coordinate work across time zones and to manage variations in team members' "local" work schedules and demands. Working virtually also requires keeping all members informed. Unfortunately, some members may initially lack the discipline to follow virtual team agreements with respect to information sharing. For example, phone calls and emails between a subset of team members may feel comfortable and appear efficient but could prove to be self-defeating when other members are deprived of critical information or made to feel like second-class team members.²⁴ Creating new habits around the use of shareware and other technology platforms which allow members to archive documents and use message boards are among the challenges facing virtual teams during the norming stage.

Norms must also address the quality and candor of communication. In any team, members may be reluctant to share creative but potentially divisive ideas with their teammates. In the virtual context, it is not easy to test the waters, gauge potential reactions, and/or modify ideas based on the subtle feedback often available in co-located teams. Virtual team members may also withhold message postings critical of teammate suggestions to spare others from embarrassment. Thus, norms that require complete information sharing have the paradoxical effect of making virtual team members more cautious when it comes to publicly sharing untested ideas or offering criticisms of others.²⁵ Clearly, establishing trust in earlier stages of team development is a necessary condition for solidifying these kinds of norms at this stage.

Performing

The performing stage of development requires that teams effectively collect and share information, integrate members' inputs, look for creative solutions to problems, and prepare deliverables for outside sponsors. At this stage, virtual team mem-

bers are able to collaborate and sustain a task focus across multiple assignments.²⁶ This is "crunch time" as teams become aware of impending deadlines and increase their activity to ensure that the deadline is met.

Maintaining team performance and synergy during this stage is particularly challenging for virtual project teams. Virtual team members can face competing pressures from local assignments, frustrations over free-riding teammates, and communication problems associated with asynchronous communication. Without a formal leader to maintain team morale and motivation, virtual team members may lose focus. Failure to meet deadlines, poorly written reports, and ill-conceived recommendations may have serious career consequences for all concerned. Hence, the performing stage of team development can be a period of great satisfaction and/or stress.

The experiences of virtual project teams throughout their life cycles are more complex and challenging when compared to face-to-face project teams. For managers charged with supporting virtual project teams, additional insights may be gained from studying multiple "real life" virtual teams as they move through their life cycles. Of specific interest are the factors associated with performance effectiveness at each stage of team development.

FOODCO: A Longitudinal Study of Virtual Project Teams

To learn more about how virtual project teams develop, we followed six virtual project teams from FOODCO, one of the nation's leading food service distributors. The six project teams were formed as part of an Executive Leadership Institute (ELI) commissioned by FOODCO's top executives at a major southeastern university in the US. FOODCO executives requested that a key component of the ELI be projects requiring participants to work in cross-disciplinary virtual project teams addressing business issues that executives deemed "critical" to company performance. ELI administrators assigned four to five participants to each project team, ensuring that each team had cross-functional representation and included at least one participant with expertise relevant to the issue under investigation. Team assignments, listed in Table 2, required the collection of archival data, interviews with key employees in the company, analysis and synthesis of this information, and the development of recommendations and presentations for these projects. A complete description of the ELI goals and objectives, the virtual team as-

Table 2
Project Team Assignments

Team	Name	Project Objective
1	ACQUIRE	To develop an integration strategy for acquisitions
2	ITECH	To determine how to efficiently transfer information technology from one subsidiary company to other parts of the firm
3	TRANSFER	To determine how to transfer best practices from one division of the company to another
4	AP	To streamline the accounts payable process
5	COMM	To conduct a corporate communications audit
6	CAREER	To develop career paths for specific jobs

signments, and the methodology used to assess the evolution of virtual teams is provided in the Appendix.

The project design allowed team members to work briefly face-to-face during each of three residency periods prior to the project presentations. However, the majority of their work was necessarily completed while team members worked in their home offices. Technology available to the teams included phone, email, fax, conference calling, and other resources necessary to work collaboratively. FOODCO assigned a senior sponsor to each virtual team to assist in the project. Sponsors were company executives who had a vested interest in seeing the team succeed and were willing to help obtain needed resources, overcome organizational barriers, and provide guidance on how to approach and complete the team's work.²⁷ Teams were instructed to initiate contact with their senior sponsors, as needed, throughout the eight-month project period. Sponsors would not do a team's work nor be responsible for the quality of the team's deliverables.

Next, we summarize our survey and interview findings for each time period.

The Virtual Team Life Cycle

Time 1: Forming—Unbridled Optimism

During the first residency period, team members' perceptions of the likelihood of team success reflected a sense of unbridled optimism, which is also characteristic of most non-virtual work teams. Team members were able to meet briefly with their project teammates, and survey results following these early meetings suggested that teams started

on an equal footing. There were no differences in team members' initial assessments of their time available to work on the project, their comfort with technology, and their confidence in working virtually. Perceptions regarding the meaningfulness of their assignment, the support for the project in their local offices, and the availability of resources to carry out the project also did not differ.

Team members felt confident that they could meet the desired performance goals despite the nature of the virtual task. Responses to open-ended questions illustrated invariably high levels of optimism regarding how easily team members expected to complete their projects and how well they would work together. Some representative comments included:

"I believe we have a great team and will work well together. We all understand the importance of the project and intend to take it seriously." (ACQUIRE team member)

"I feel the team will work well together, and I expect us to be very effective." (COMM team member)

"I think the team will work very well together. We all agree on the substance and the goal." (CAREER team member)

Time 2: Storming—Reality Shock

A second survey was administered early in the second residency, approximately two months later. At this time, several teams reported having spent little, if any time working on their virtual team projects since their initial meeting. Other teams reported spending several hours a week on their projects. Asked to describe which stage of development best characterized their team at Time 2, one team reported that they had already reached the performing stage ("Team members are clear about their responsibilities, and we are making excellent progress"). Other teams felt they were still in the forming stage ("We're just getting started").

At Time 2, we noted several differences between team members' perceptions of mission clarity, team trust and support, involvement of senior sponsors, and productivity. Most teams had not yet identified a leader by this point in the program. Some teams neglected boundary management issues—failing to keep sponsors informed of problems or developing strategies for using sponsors to assist with resource acquisition, for instance. One team member, indicating that his team had been

delayed by the absence of senior sponsor input, remarked, "Due to other business problems, our senior sponsor has been unavailable. This has made it difficult for us to get a clear focus on the project."

More than half of the program participants indicated that their teams had encountered some difficulties working on their project in the virtual environment between Times 1 and 2. Lack of commitment from some team members became evident at this point as several teams reported occurrences of "free riding." While it is not uncommon for members of co-located teams to express concern over some team members not doing "their fair share," the frustrations that our virtual team members expressed with non-performers appeared amplified because team members could not directly observe or influence one another's behavior. Specific comments reflected four primary issues with which some groups had struggled: establishing leadership roles, setting direction, coordinating work, and building commitment to the task. Comments in these areas included,

"No one has taken a leadership role. We have not made the project the priority that it deserves." (ITECH team member)

"Team members' day-to-day tasks are being used as an excuse to avoid doing the project." (ITECH team member)

"It has been difficult to get all members to attend each conference call. Out of 5 calls there has not been perfect attendance yet." (AP team member)

These comments reflect a variety of issues impeding trust-building and commitment. To their credit, many teams began to address these issues during the second ELI residence period. The opportunity for face-to-face interaction allowed some teams to "clear the air" and deal with passive and destructive individual and team behaviors. Resolution of team issues provided a basis for the establishment of team norms, reflecting an example of "punctuation" where some teams discussed and changed their work processes.

Time 3: Norming—Refocus and Recommit

By Time 3 (during the third residency period, approximately mid-way through the project life cycle), most teams recognized the need for reaching agreement on how they would operate going forward. Teams had revisited (and reinforced) existing norms or had established new norms regard-

ing information collection, document sharing, task responsibilities, acceptable attendance at conference calls, and team commitment. Teams discussed ways in which members could be held more accountable for timely delivery of project assignments and openly confronted problems that might interfere with the completion of their projects. Teams also expressed some regret about their initial passivity, lack of initiative, and delays in collecting information.

Our survey and interview data at this point suggested that teams now differed with respect to perceived levels of team trust, sponsor support, and team performance (the percentage of work completed to date). For example, several teams reported high levels of trust in their teammates, while others reported minimal intra-team trust. At Time 3, the ACQUIRE and AP teams reported making the most progress, indicating that they had completed more than half of their projects. ITECH members reported making the least amount of progress on their assignment, having completed only a quarter of their planned work.

We used team-member perceptions of progress toward project completion as a proxy for team performance and examined what factors measured at Time 2 predicted team performance at Time 3. Results indicated that progress at Time 3 was associated with greater levels of communication, knowledge sharing, and confidence in performing the task at Time 2. Participant comments indicated that several teams struggled with issues of commitment and accountability during the norming stage that likely inhibited their progress. Developing norms required each team member to fulfill his/her assigned role, share important information, and meet deadlines. A majority of comments reflected the desire for greater commitment to the project, more discipline in working on the project, and better time management, communication, and coordination. Below are several illustrative comments:

"Virtual teaming is something that requires discipline." (ACQUIRE team member)

"We need to develop a sense of urgency." (ITECH team member)

"It is difficult to get people to do what they say." (TRANSFER team member)

"You must make firm commitments to specific time schedules." (CAREER team member)

These observations prompted some team members to increase their commitment levels and their

communications with one another. When asked "What additional changes, if any, do you need to make to deliver an outstanding project?" many participants reported the need to develop a greater sense of urgency about the project, to speed up their work, and to communicate responsibilities more explicitly. Representative comments included:

"We may need to buckle down to get to work. Devoting the necessary time to the project has it challenges." (CAREER team member)

"We really need to communicate each team member's responsibilities" (ACQUIRE team member)

"We need to refocus our energy on moving forward." (COMM team member)

Time 4: Performing—A (Sometimes Mad) Dash to the Finish

At Time 4, differences among teams emerged with respect to levels of team commitment, sponsor involvement, coordination, intra-team trust, and member "loafing." During the final week of the ELI, the teams presented their project findings and recommendations to the other ELI participants, seven senior FOODCO executives, including the CEO, CFO, and president, and five faculty members. These twelve non-participants evaluated each project for content, quality, and anticipated effectiveness. Aggregated team scores from these observations provided the performance data used to assess how a variety of factors affected team effectiveness.

Project team effectiveness as measured above was found to be a function of team members' perceptions of the availability of resources at Time 1. Teams that perceived greater amounts of resource availability at the onset of their projects performed better at the end of the project. At Time 2, teams with greater mission clarity, more time to examine work process effectiveness, and higher perceived levels of sponsor support were more effective at Time 4. At Time 3, none of the variables we examined predicted team performance at Time 4.

At Time 4, we also asked participants to reflect on their experiences and to consider what they had learned from their virtual projects. Responses suggest that the teams clearly underestimated the challenges associated with working virtually. During the "honeymoon period" (Time 1), they had anticipated minimal conflict, strong individual contributions from team members, and few obstacles to project completion. By the end of the project,

participants uniformly remarked that virtual interactions were far more difficult than they had expected. Participants' responses to the question "If you could turn back the clock and start over, what would you do differently?" included,

"Better define what the project was. We had a lot of problems at the beginning not knowing about what we were to work on." (AP team member)

"We could have included our mentor (sponsor) more in the planning phase of the project; this would have helped eliminate any wrong paths." (CAREER team member)

"More discipline in hitting timeline." (TRANSFER team member)

Additionally, when asked "What advice would you give future virtual teams?" nearly three quarters of the participants replied "Start earlier!" stressing the importance of establishing a clear mission and structured work processes from the outset. Representative comments included:

"Start early, meet often, and hold each other accountable to timelines and workloads." (TRANSFER team member)

"Communicate a lot in the early stages. Find out what each person's strengths are, and get everyone involved. Hold members accountable." (AP team member)

"Start early and talk at least every other week. Set firm deadlines." (CAREER team member)

Comparing the Most and Least Effective Teams

A profile of the "best" team shows that at each step of the life cycle this team was proactive, focused, resourceful, and unafraid to seek support and guidance as needed. Specifically, evaluations of team effectiveness demonstrated that among the six virtual teams, CAREER was the most effective while AP was the least effective. A comparison of these teams at each data collection period reveals the significant issues that successful virtual teams resolve at various stages of their development. At Time 2, CAREER had developed much stronger consensus regarding team mission compared to the AP team. CAREER also reported greater levels of sponsor support and more frequent assessments of team processes than the AP team. These differences likely reflect the amount of

time that the CAREER team committed to their project at the beginning of the assignment compared to their colleagues on the AP team.

Results at Time 3 revealed other differences between the CAREER and AP teams. For instance, the CAREER team recognized that they had developed effective working procedures but were not fully clear about responsibilities. Team members realized that their work processes might need to be revised to meet their deadline and perform well. The AP team, in contrast, struggled with how they could best accomplish their work. CAREER was also more confident than AP that they could deliver an outstanding product and that their recommendations would be acted upon by the firm.

At Time 4, differences between the two teams were even more apparent. In particular, CAREER reported maintaining higher levels of mission clarity, communication, commitment, and trust among team members. These differences suggest that between Times 3 and 4 the CAREER team recognized what changes needed to be made and successfully adapted their work processes to deliver an outstanding final product.

Guiding Virtual Teams Through the Life Cycle: Guidelines for Managers

This study represents one of the few research efforts that follow virtual project teams from project inception to completion. We were fortunate to have access to six virtual teams situated in an organization, dealing with real issues that required a tangible outcome for top management. Our findings thus provide a rare glimpse into the dynamics of "real life" virtual teams. Our data enabled us to explore which factors at each stage of development contribute to team performance and to identify the special challenges confronting virtual project teams as they develop. Importantly, however, our results should be interpreted with some caution as the experiences of our 29 participants and the six teams they formed as part of the ELI may not have been captured fully in our data nor may their experiences be applicable to all virtual project teams. For example, we do not know the extent to which the teams were evenly distributed in talent and capabilities or the extent to which team sponsors or local managers encouraged team members to take the endeavor seriously. These limitations notwithstanding, we offer our insights into how managers can guide virtual project teams through the project life cycle.

Not surprisingly, we found that working virtually delayed team progress through the forming stage by diminishing opportunities to communicate. In-

deed, many of the virtual project teams communicated infrequently (if at all) during the early, forming stages of their projects. The lack of communication among team members reduced mission clarity and productivity at the project's onset, stifling early momentum and sending these teams into a spiral of failure. Contrary to our expectations and past research on virtual student teams, trust was not particularly difficult to establish at the beginning of the teams' projects. In fact, for almost all of the teams, perceptions of trust peaked at Time 2 and declined thereafter. Perhaps team members recognized that participation in the ELI was highly selective and inferred that teammates should be competent, hard working, and trustworthy. As the projects progressed and some team members failed to demonstrate competence and commitment to the team during the storming and norming stages, disillusionment set in, and perceptions of trust eroded.

Our findings underscore the critical role that senior sponsors can play in assisting virtual project teams through the early stages of development. The most successful teams we observed actively sought and initiated senior sponsor involvement at the early and middle stages of team life cycles. Sponsors helped these teams define their mission, set guidelines and accountabilities, and build confidence, facilitating team formation and reducing the length of the storming stage. In contrast, teams without early sponsor involvement lacked direction and momentum during this formative period. The lack of support prevented these teams from successfully navigating through the storming stage, often undermining team members' confidence and motivation to learn through the remainder of the projects. Indeed, our observations of the ELI teams are consistent with prior research in the project management literature which suggests the importance of early, pre-project planning and leadership support. This literature concludes that successful project teams invest time upfront with project managers to deal with the "fuzzy front end" of their projects which are often characterized by an ill-defined purpose, ambiguity regarding roles and responsibilities, and the uncertainty of acquiring resources and support. Hackman has recently offered the same insights in his discussion of the role of leaders in managing successful teams.²⁸

As the ELI teams entered the norming stage of development and attempted to more clearly define work processes, many struggled with coordination and commitment issues. Team members expressed doubts about one another's commitment to the projects and raised concerns of possible "free

riding" by some members, reflected in missed meetings, scheduling conflicts, and unreturned emails and phone calls. These behaviors may have been due to more pressing local work demands or technological breakdowns. However, without the benefit of direct observation and a full understanding of team members' local work contexts, both of which are typically afforded to colocated teams, virtual team members attributed the lack of participation and communication to a lack of commitment. Managers should encourage communication between team members to clarify whether lapses in participation are due to a lack of commitment or competing demands.

Consistent with prior research on virtual teams, we found that periodic face-to-face meetings marked periods of "punctuation" and provided teams with an opportunity to (re)assess their progress. For some teams, a pattern emerged in which energy devoted to working on the projects peaked shortly before each residency and quickly dissipated when team members dispersed. However, our best performing teams took advantage of the time between residencies to maintain momentum and developed a learning orientation by continuously sharing information and knowledge with one another. This disciplined approach to managing their "virtual" activities enabled teams to be more confident of their ability to deliver an outstanding project and more confident that their recommendations would be implemented.

Our observations and analyses suggest important implications for organizations considering the use of virtual project teams. Based on prior research regarding on-site team development and supported by findings derived from our longitudinal observations of the six ELI virtual teams, we offer suggestions for possible interventions appropriate to each stage in the virtual team life cycle. These interventions, described below, are summarized in Table 3.

Interventions at the Forming Stage

Our findings highlight a degree of unbounded but perhaps unrealistic optimism about potential virtual team success during the forming stage. This was often followed by the shock of slow progress, concern about teammates' commitment levels, problems with sponsor support, and anxiety over pending deadlines during later stages of team development. All six of our teams reported that their first experience working virtually was surprisingly difficult, and many commented that the opportunity provided valuable lessons that would help them in any future virtual team assignments. Frus-

Table 3
Managerial Interventions During the Virtual Project Team Life Cycle

Formation	Storming	Norming	Performing
<ul style="list-style-type: none"> ● Realistic virtual project team previews ● Coaching from experienced team members ● Develop a shared understanding and sense of team identity ● Develop a clear mission ● Acquire senior manager support 	<ul style="list-style-type: none"> ● Face-to-face team building sessions ● Training on conflict resolution ● Encourage conflicting employees to work together to find common ground ● Shuttle diplomacy and mediation to create compromise solutions 	<ul style="list-style-type: none"> ● Create customized templates or team charters specifying task requirements ● Set individual accountabilities, completion dates, and schedules ● Establish procedures for information sharing ● Distinguish task, social, and contextual information; design procedures appropriate for each ● Assign a team coach with skills for managing virtually 	<ul style="list-style-type: none"> ● Ensure departmental and company culture supports virtual team work ● Provide sponsor support and resources for team to perform

trations stemming from unrealistically high expectations are not uncommon to project teams.²⁹ However, we believe that managerial prescriptions for helping virtual teams establish reasonable expectations must be sensitive to the unique challenges of virtual work.

Providing virtual project team members with insights from those who have served in similar situations is one way we suggest to improve team formation, as it should alert new teams to potential problems and pitfalls.³⁰ For example, Sabre uses realistic previews to focus virtual team members' attention on the importance of getting off to a fast start, contacting sponsors early, and scheduling opportunities for synchronous communication well in advance. Previews might also include other specific insights gained from previous virtual project team experience or might profile the characteristics of successful virtual teams as a benchmark against which new teams can chart their progress.

At the forming stage, care should be taken to help the virtual project team establish a shared team identity to prevent team members from abandoning the virtual project when they return to their home offices. Initial communications, whether face-to-face, teleconference, videoconference, or on-line, should encourage the exchange of personal information about backgrounds, skills, and experiences designed to help team members get to know one another and identify common ground. To help the team create a unique identity, teams might develop their own language or jargon to engage members or develop logos/symbols to serve as a constant visual reminder of the team and its mission.³¹

Our findings complement prior research on work teams by highlighting the importance of involving

a senior sponsor early in the team's life cycle and gaining "unequivocal support from the top of the organization."³² Indeed, the least effective sponsors we observed proceeded with their roles in a laissez-faire manner, did not proactively contact the teams, and did not attend their final presentations. Moreover, these sponsors failed to clarify their teams' missions until the teams had completed a considerable amount of work. This created enormous frustration when midway through the projects the sponsors expressed concern that the teams were not meeting expectations.

Effective senior sponsors can help virtual project teams clarify their mission and ensure that team members have the resources needed to accomplish their tasks, such as funding travel costs for intermittent face-to-face meetings.³³ Senior sponsors can also be used to provide pertinent information and an "expert opinion" on the teams' task. For example, in the virtual teams that Lipnack and Stamps observed from Eastman Chemical Co. and Sun Microsystems, senior sponsors advised teams on their task, were invited to key meetings, and were included in email correspondence between team members.³⁴ Finally, sponsors can help teams create "small wins" upfront that provide a springboard for future performance. For example, one of the more successful virtual teams we followed used their sponsor to help develop and administer a survey shortly after the initial meeting. The launch of the survey energized team members and provided a confidence boost for their efforts going forward. This practice has been used successfully at IBM where virtual team sponsors assist teams in creating an important 30-day goal upfront that requires full team participation. Similar to the team we observed, teams at IBM use these 30-day

projects as vehicles to come together and build early momentum.³⁵ An important intervention at the forming stage requires managers to foster a collaborative partnership between sponsors and their virtual teams.

Interventions at the Storming Stage

Much has been written about the self-fueling spiral of success or failure experienced by many types of teams.³⁶ In particular, teams that experience early success gain confidence and motivation, which fuels future efforts and continued success. Conversely, teams that struggle initially lose confidence and momentum, stifling motivation and sending these teams into a spiral of failure. The importance of teams getting off to a fast start and building on early successes to generate momentum cannot be overemphasized. The virtual project team members we followed consistently pointed to the need for teams to build consensus around the team mission, work out role assignments, commit to goals, and confront conflicts. The most effective virtual teams reported the eventual development of greater mission clarity and higher levels of coordination and agreement around monthly goals, all of which reflected the time that these teams invested up front on their projects and the active, early involvement of the senior sponsor. Less successful teams reported early ambiguity around the project's purpose, unresolved coordination problems, and conflict over some members' lack of commitment, all symptoms of the self-fueling spiral of failure.

Though sometimes costly and inconvenient, a face-to-face team-building session for virtual teams is highly recommended early in the team development process to reduce the impact of an unsuccessful storming stage on team development. The senior sponsor could assign an experienced team facilitator or "coach" to help virtual team members focus on building consensus around a team's mission, differentiating roles, clarifying assignments, and resolving conflicts. Meeting face-to-face provides the richest possible communication context, often proving critical for overcoming problems encountered early in a virtual team's development.³⁷

In situations where early face-to-face meetings are not possible, alternatives such as video or teleconferencing meetings can still provide a relatively rich opportunity for exchanges and can offer many, but not all, of the advantages of face-to-face meetings. If conflict cannot be resolved at such meetings, teams may employ more overt techniques aimed at addressing specific points of con-

flict.³⁸ For instance, a team leader or facilitator may ask conflicting team members to work together to resolve a problem and to foster greater understanding and appreciation of each other's perspective. In rare cases where a consensus regarding protocol or other coordination issues cannot be reached, teams may consider using "shuttle diplomacy" or mediation.³⁹ Specifically, a facilitator will communicate with team members individually to hear issues, concerns, or ideas, and then consolidate these viewpoints to come up with a compromise solution.

Interventions at the Norming Stage

Our teams reported that problems with information gathering, commitment from some team members, and free riding by others became more apparent at the norming stage of development. Teams acknowledged that their current work pace would make it nearly impossible to meet deadlines. The seriousness of these shortcomings led many teams to markedly increase their work efforts. For the best teams, a renewed commitment proved critical for project completion. For those teams hopelessly behind, norms governing commitment and productivity developed too late, the teams became stressed, and the final results were relatively disappointing.

We believe that early managerial intervention will increase the likelihood that teams develop norms governing commitment, accountability, and productivity, as our successful teams did. Managers who observe teams struggling with scheduling and coordination conflicts, miscommunications between distal team members, and gaining team members' commitment to the task can provide virtual teams with templates that identify strategies for improved team coordination.⁴⁰ Teams can then customize a template to include specific task requirements, individual accountabilities, expected completion dates, and mechanisms for collecting, collating, and sharing information. Managers can also help virtual teams identify norms regarding communication content, including how to share contextual information. For example, managers at Intel encourage virtual team members to send a "face" depicting their mood on any given day so that team members can better understand how to interpret and respond to team member communications.⁴¹

Some virtual teams may benefit from using electronic decision support systems to stimulate brainstorming and group decision-making.⁴² Managers should provide training to ensure that team members know how to use these technologies and use

them appropriately, as needed. Virtual team leaders at Novartis recommend that training team members in the use of more complex collaborative technologies should be incremental, allowing team members to become comfortable with various features of a given technology over time.⁴³

In addition to the impact of a supportive senior sponsor, another possible intervention is to assign project teams "coaches" skilled in virtual management to nurture virtual project teams through the early development stages. Senior sponsors may not have had experience managing virtual teams and/or may not be sufficiently accessible to team members to provide the type of personal suggestions a "coach" could provide. In addition to providing team members with a realistic preview of the virtual team experience, coaches could counsel team members on- or off-line, model the appropriate use of communication and collaboration technologies, and reinforce the value of managing boundary relationships.⁴⁴ Indeed, our most successful teams were particularly proactive, seeking out informal sources of coaching and support. Once team members experience success working virtually, they should become well situated to coaching new virtual project members and teams.

Interventions at the Performing Stage

As these results suggest, many factors contribute to virtual project team effectiveness. We have emphasized how team processes can contribute to or detract from team performance. However, it is equally important to recognize that virtual team members do not function in isolation. Corporate and sub-unit cultures may also influence virtual team effectiveness.

Virtual project team sponsors may need to intervene to shape a more supportive corporate and sub-unit context within which virtual teams can flourish. In most instances, serving on a virtual project team is a part-time assignment. Team members must balance competing local demands for their time with commitments made to their virtual project teams. Virtual team sponsors must be sensitive to these dual demands and, as needed, be willing to negotiate with local executives the relative importance and time commitment required for successful virtual project team participation.

One of our least successful teams reported minimal support for their project activities among executives in the divisions represented on this team. Team members also believed that their performance evaluation and compensation for their "real (non-virtual) job" were at risk if they made more than a token commitment to the virtual project

team. In contrast, our most successful virtual team reported complete support for their virtual project efforts by senior managers in all of the divisions represented by the team. By providing team members with the necessary time and resources to work on both their local and virtual projects, senior management signaled that outcomes of the virtual project team were valued. The lesson seems obvious: To thrive, virtual project teams must be embedded in supportive corporate cultures.

In addition to providing sufficient resources, managers can use other strategies to create a supportive culture. For example, virtual team leaders at ARCO reported that to support their virtual team's efforts, team leaders "buffer" interference from on-site work demands.⁴⁵ When virtual team members are relieved from some of their typical local demands, they may focus more energy on the virtual team assignment without fear of reprisal from their local managers.

The creation of virtual teams will likely require that managers realign recognition and reward systems to better assess and reward virtual team performance.⁴⁶ For example, Sabre uses a balanced scorecard approach for tracking virtual team performance that provides quantitative and qualitative information including growth, profitability, process improvement, and customer satisfaction.⁴⁷ Teams may wish to complement this objective performance data with 360 degree evaluation procedures to capture unique individual contributions. By realigning recognition and reward systems, managers help their virtual teams discover how various stakeholders, including customers, other team members, and outsiders perceive the quality of their work.⁴⁸

Conclusion: Timing the Interventions

To mobilize virtual project teams, managers need insights into the challenges associated with each stage of the virtual team life cycle. Based on our comparison of flourishing and floundering virtual teams, it appears that managers who can recognize the signs of steady progress as well as the signs of distress associated with virtual team development will be in stronger positions to keep their teams on track. Similar to the concept of a "teachable moment" for introducing skills training at the point where these skills are most salient, managers must learn to time the introduction of interventions to virtual team life cycle challenges.⁴⁹ To conclude, we suggest a number of stage-appropriate interventions.

In the formation stage, realistic previews, exercises surrounding the creation of mission state-

ments, and assistance in building team identity are all potentially useful strategies for helping virtual project teams get off to a fast start. The active involvement of a senior sponsor to clarify the team's mission and to ensure that the team has the resources it needs to perform can also boost early success. Because teams typically experience frustration and conflict in the storming stage, most teams should benefit from managerial interventions to help select appropriate procedures for working through conflicts, pushing teams more quickly to the norming stage of team development. Encouraging teams to establish a strong work ethic and to create mechanisms for holding members accountable for meeting deadlines are interventions particularly important at the norming stage.

At the performing stage, managerial interventions to facilitate brainstorming, decision making, and monitoring of progress against objectives and timelines will enhance team performance. Finally, and perhaps most important, are ongoing managerial efforts to embed virtual teams in supportive work contexts. Similar to other virtual team experiences chronicled in the literature, our six teams struggled to balance their virtual team demands with home office priorities.⁵⁰ To combat these competing demands, managerial interventions could take the form of negotiating work priorities with on-site supervisors and aligning reward systems to recognize virtual team contributions.

Certainly, sponsors, coaches, managers, and virtual team leaders and members have many intervention options to assist struggling virtual teams. But, as with so many organizational activities, timing is everything. Introducing interventions at the appropriate stage of development represents an important tool for leveraging virtual team performance. Having the tools in the toolkit is only the beginning. Knowing which tool to use when is the sign of the true master craftsman.

Appendix

Descriptive Information Regarding the Six Virtual Project Team Participants

The members of the six virtual project teams that we followed were employed by FOODCO. This company distributes food products to schools, hospitals, fast-food chains, and individually owned and operated restaurants, and manufactures a limited number of its own products. Executives at FOODCO commissioned a large university located in the southeastern US to create an Executive Leadership Institute (ELI) that would (1) align organizational learning with strategic business needs, (2)

establish cross-organizational networks to encourage the sharing of best practices, (3) prepare managers for expanded organizational roles, (4) integrate new managers from FOODCO's recent acquisitions, and (5) develop a unified company culture across its multiple operating companies.

The 29 participants in the ELI program held positions of substantial responsibility in human resources, finance, marketing, sales, and operations areas. Superiors nominated participants for the program based on their potential to contribute to the company beyond their current levels of responsibility. Fourteen participants were from the executive ranks, while the remaining participants held middle-management positions.

Summary of Methodology Used to Study Virtual Project Teams at FOODCO

To assess the factors that contributed to virtual project team performance at various stages of the teams' life cycles, we collected survey and interview data throughout the eight-month project period. Specifically, during each of the four residence sessions, ELI participants completed surveys and participated in interviews designed to assess their attitudes and behaviors during the virtual project team assignment.

Participant surveys included both quantitative and qualitative questions. The quantitative data we collected at each time period varied slightly to reflect anticipated differences in development issues. During the first residency, participants were asked about the meaning of their project, its usefulness to the firm, the impact that the project would have on the company, how competent they felt to complete the project, and the anticipated climate for teamwork. During subsequent residence periods, survey questions focused on team process variables, such as perceptions of mission clarity, trust levels among team members, learning capacity, extent of sponsor support, and specific performance outcomes, including percentage of project completed, perceptions of team productivity, and perceived efficacy of completing an outstanding project.

Surveys also included several open-ended questions allowing participants to describe their views of the project, the challenges associated with virtual work, and their teams' responses to these challenges. For instance, during the first residency, we asked participants to "Describe your expectations for how you think your team will work together." Questions at the third residency focused on what individuals had learned about working virtually and what they would do differently had they been able to start over. During the final residency, we asked participants to reflect on their experience, to discuss what they learned about team processes that they could carry over to their current jobs, and to consider what advice they might give future virtual teams.

At the end of the fourth residency, teams presented their analysis and recommendations to a group of FOODCO's top executives and ELI administrators. This group rated the quality and content of each team's analysis of the critical business issue they researched and the quality of the recommendations they provided. They also rated the quality of the presentation delivered by each team. Each observer calculated an overall score for each team based on these three dimensions. We aggregated and averaged ratings for each team and used the result as the measure of team performance in further analyses.

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